

Appln. No. 10/044,281
Amendment After Final Rejection dated June 4, 2004
Reply to Office Action of March 4, 2004

REMARKS

Claims 1-30 are pending in this application and stand rejected. Claims 1, 12, 13, 20 and 30 are independent.

By this Amendment After Final Rejection Applicants seek to revise claims 1, 12, 13, 20 and 30. Upon entry of this Amendment, claims 1, 12, 13, 20 and 30 will remain independent.

The Examiner is thanked for the telephonic interview conducted on April 28, 2004. In view of the Examiner's comments during that interview various claims have been revised to clarify the nature of this invention. Such changes are not felt to alter the scope of those claims. Rather, those changes clarify that the arrangement of chambers and other structure in the ink cartridge. The revised claims specify that the cartridge, when seen in front view, has just a single row of at least three ink chambers arranged in a widthwise direction, and that the chambers each extend from an inner side of the cartridge front wall to the inner side of the cartridge back wall.

The Rejection Under 35 U.S.C. § 102

Claims 1-30 have been rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,302,530 to Shimada et al.¹ Applicants respectfully traverse this rejection and submit the following arguments in support thereof.

Applicants' invention, as described in claim 1, is directed to an ink cartridge for an ink jet printer having plural ink supply needles communicating with a print head. The cartridge includes a housing with at least bottom, front and back walls, plural ink chambers

¹ Referred to in the Office Action as Shinnada.

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arranged so that when the ink cartridge is seen in a top view the ink chambers are arranged in an 1 by 3 (or greater) array. The ink chambers are positioned in succession along a widthwise direction parallel to the front wall. Each of the ink chambers extends from an inner surface of the front wall to an inner surface of the back wall of the housing. Ink supply portions equal in number to the number of ink chambers are formed in the bottom wall of the housing within respective ink chambers and they arrayed so that when the ink cartridge is seen in front view the ink supply portions are arranged in the widthwise direction. Each of the ink supply portions has an inner opening and an outer opening for receiving a respective needle. When the ink cartridge is seen in front view, a first center-to-center distance from the inner opening of a first ink supply portion to that of a second ink supply portion adjacent to the first ink supply portion is different from a second center-to-center distance from the outer opening of the first ink supply portion to that of the second ink supply portion.

Claim 12 is directed to an ink cartridge for an ink jet printer having plural ink supply needles communicating with a print head. Such an ink cartridge has an ink cartridge main body with bottom, front and back walls, at least two inner partition walls dividing the ink cartridge main body into ink chambers arranged so that when the ink cartridge is seen from above the ink chambers are arranged in an $M \times 1$ array, where M is an integer of value at least 3, and the ink chambers are arranged in succession along a widthwise direction parallel to the front wall. Each ink chamber extends from an inner surface of the front wall to an inner surface of the back wall of the housing, and the ink chambers have respective ink outflow ports. The cartridge also has a number of ink supply ports equal to the number of chambers and which are formed in the bottom wall and adapted to receive and connect to the respective ink supply needles. The ink supply ports are arrayed so that when the ink cartridge is seen from the front the ink supply ports

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are arranged in the widthwise direction and are disposed on the bottom surface of the ink cartridge main body so that ink in the ink chambers flows from the ink outflow ports to the ink supply ports. Each of the ink outflow ports is disposed substantially on a central line of the corresponding ink chamber in the widthwise direction thereof, the ink supply ports of the ink chambers are arrayed with an array pitch that is different from an array pitch of the corresponding ink outflow ports, and the ink supply port located at an end of the array is disposed substantially on the central line of the corresponding ink chamber in the widthwise direction thereof.

As set out in claim 13, this invention also involves an ink cartridge for an ink jet printer with ink supply needles communicating with a print head. Such an ink cartridge includes an ink cartridge main body with bottom, front and back walls, and at least two inner partition walls dividing the ink cartridge main body into plural ink chambers arranged so that the ink cartridge, in top view, has the ink chambers arranged in an M by 1 M is an integer of value at least 3, the ink chambers being arranged in succession along a widthwise direction that is parallel to the front wall. Each ink chamber extends from an inner surface of the front wall to an inner surface of the back wall of the housing, and the ink chambers have respective ink outflow ports. The cartridge also includes a ink supply ports in an amount that is the same as the number of ink chamber, and they are formed in the bottom wall and adapted to receive and connect to the respective ink supply needles. The ink supply ports are arrayed so that when the ink cartridge is seen from the front ink supply ports are arranged in the widthwise direction and disposed on the bottom surface of the ink cartridge main body so that ink in the ink chambers flows from the ink outflow ports to the ink supply ports, respectively. There are plural through-holes, and at least one of the through-holes includes plural recessed portions offset one from another to compensate

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for a difference in array pitch in the widthwise direction between the ink supply ports and the ink outflow ports when the ink cartridge is seen in the front view. The ink outflow ports communicate with the ink supply ports via the through-holes, respectively.

According to claim 20, Applicants' invention also is directed to an ink cartridge for an ink jet printer with plural ink supply needles communicating with a print head. The ink cartridge includes an ink cartridge main body with bottom, front and back walls, and at least two inner partition walls dividing the ink cartridge main body into plural ink chambers arranged so that when the ink cartridge is seen from the top the ink chambers are arranged in single row, and there are at least 3 chambers. The ink chambers are arranged in succession along a widthwise direction that is parallel to the front wall, each of the ink chambers extends from an inner surface of the front wall to an inner surface of the back wall of the housing, and the ink chambers have respective ink outflow ports. The cartridge also has a number of ink supply ports formed in the bottom wall equal to the number of ink chambers and which are adapted to receive and connect to the respective ink supply needles. The ink supply ports are arrayed so that when the ink cartridge is seen from the front the ink supply ports are arranged in the widthwise direction and disposed on the bottom surface of the ink cartridge main body so that ink in the ink chambers can flow from the ink outflow ports to the ink supply ports, respectively. The array pitch of the ink outflow ports is different from the array pitch of the ink supply ports. The ink chambers communicate with the ink supply ports via respective through-holes, each formed as continuous recessed portions, and the recessed portions are vertically arranged and disposed so that their axes are offset in the widthwise direction from one another to compensate for a difference in array pitch in the widthwise direction between the ink supply port and the ink outflow port for at least one of the ink supply ports.

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Applicants' invention, as set out in claim 30, concerns an ink cartridge for an ink jet printer with plural ink supply needles communicating with a print head. The ink cartridge has an ink cartridge main body with bottom, front and back walls, and at least two inner partition walls that divide the ink cartridge main body into plural ink chambers arranged so that when the ink cartridge is seen from above the ink chambers are arranged in an $M \times 1$ array, where M is an integer of value at least 3. The ink chambers are arranged in succession along a widthwise direction parallel to the front wall, and each of the ink chambers extends from the inner surface of the front wall to the inner surface of the back wall of the housing. The ink chambers have respective ink outflow ports. The ink cartridge also has ink supply ports in a number corresponding to that of the ink chambers which are formed in the bottom wall and adapted to receive and connect to the respective ink supply needles, and which are arrayed so that when the ink cartridge is seen from the front the ink supply ports are arranged in the widthwise direction and disposed on the bottom surface of the ink cartridge main body so that ink in the ink chambers can flow from the ink outflow ports to the ink supply ports, respectively. When the ink cartridge is seen in the front view each of the ink outflow ports is disposed substantially on a central line of the corresponding ink chamber in the widthwise direction thereof. One of the ink supply ports, located at an end of the array is disposed substantially on the central line of the corresponding ink chamber in the widthwise direction thereof, and at least another one of the ink supply ports is disposed offset from the central line of the corresponding ink chamber in the widthwise direction thereof.

During both the personal interview on December 3, 2003, and the telephonic interview on April 28, 2004, the Examiner called attention to Figs. 4(a-c), 5(a) and 10(b) of Shimada. As previously explained, Applicants submit that those portions of Shimada are

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directed to different embodiments, and none of them suggest the present invention. For example, Figs. 4(a-c) do not show the relationship between the inner and outer openings of each ink chamber that are now claimed. Fig. 5(a) is a side cross-sectional view of one embodiment of the invention, and it does not show at least three ink supply portions arranged in the widthwise direction as claimed.

It should be kept in mind that the independent claims state that the cartridge, when seen in front view, has just a single row of at least three ink chambers arranged in a widthwise direction, and that the chambers each extend from an inner side of the cartridge front wall to the inner side of the cartridge back wall. Thus, as stressed during the April 28 telephonic interview, it is very important to consider the orientation of the different views shown in Figs. 3(a)-5(b), 10(a) and 10(c) of Shimada, since some of those views clearly depict structures which do not have or suggest the orientations recited in the claimed invention.

Nowhere does Shimada even suggest all the features of Applicants' claimed invention, and in particular, the claimed widthwise linear arrangement of ink chambers and ink supply ports, such ink supply ports being arranged at particular intervals.

Applicants will now explain why none of the embodiments of Shimada discussed in the Office Action even suggest the claimed invention.

Fig. 3(a) of Shimada is a bottom plan view of an ink cartridge. Those skilled in the art will see that the cartridge has a 4 x 2 array of both ink chambers (302aa-302ah) and ink supply ports (304aa-304ah). The spacing of the ink supply ports in both width and length is constant, in contrast to the claimed invention.

Fig. 3(b) is a bottom plan view of an ink cartridge similar to that in Fig. 3(a), differing only in that two of the chambers (302be, 302bf) are larger than the other chambers

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(302ba-bd). However, as with Fig. 3(a), the spacing of the ink supply ports in both width and length is constant, in contrast to the claimed invention.

Fig. 4(a) of Shimada is a bottom plan view of an ink cartridge having a 4 x 2 array of both ink chambers (402aa-402ah) which differ in size and ink supply ports (404aa-404ah). The spacing of the ink supply ports in both width and length is constant, in contrast to the claimed invention.

Fig. 4(b) is a bottom plan view of an ink cartridge having a 4 x 2 array of both ink chambers (402ba-402bh) which differ in size and ink supply ports (404ba-404bh). Again, the spacing of the ink supply ports in both width and length is constant, in contrast to the claimed invention.

Fig. 4(c) is a bottom plan view of an ink cartridge similar to that in Fig. 4(b), differing in that two of the chambers (402ce, 402cf) are larger than the other chambers (402ca-cd). However, as with Fig. 4(b), the spacing of the ink supply ports in both width and length is constant, in contrast to the claimed invention.

Shimada's specification states Figs. 5(a) and 5(b) are cross-sectional views of another ink cartridge. Those skilled in the art will appreciate from those two views that the cartridge must have a 3 x 2 array of ink chambers and ink supply ports (Fig. 5(a) is a side cross-sectional, meaning there are two rows of ink chambers and Fig. 5(b) is a front cross-sectional view, meaning the ink cartridge is 3 chambers in width). Fig. 5(b) shows that the ink supply ports are all arranged at uniform intervals, in contrast to the claimed invention. While the arrangement of the ink supply ports in Fig. 5(a) is not regular (one of the ink supply ports has an offset), as explained during the personal and telephonic interviews such offset is not in the

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direction claimed, the **widthwise** direction (the direction in which the three or more ink cartridges are successively arranged).

Nor do Figs. 10(a) and 10(b) of Shimada suggest the present invention. Those skilled in the art will appreciate that these drawings depict an ink cartridge with a 4 x 1 array of ink chambers 42a-d, and that as seen in Fig. 10(b), the ink supply ports 50a-d and the corresponding internal structure of the ink cartridge are all arranged along lines (there is no offset). Although chamber 42d is larger than chambers 42a-c (which are all the same size), meaning the distance between ink supply port 50d and adjoining port 50c is larger than the distances between ink supply ports 50a-c, that still does not suggest this invention.

Accordingly, none of the portions of Shimada that were applied, nor any other sections, suggest the following aspects of this invention:

- Claim 1's providing that when the ink cartridge is seen in front view, a first center-to-center distance from the inner opening of the first ink supply portion to that of a second ink supply portion adjacent to the first ink supply portion is different from a second center-to-center distance from the outer opening of the first ink supply portion to that of the second ink supply portion. Shimada just does not teach such widthwise offsetting;
- Claim 12's statement that each of the ink outflow ports is disposed substantially on a central line of the corresponding ink chamber in a widthwise direction thereof, the ink supply ports of the ink chambers are arrayed in the with an array pitch that is different from an array pitch of the corresponding ink outflow ports, and one of the ink supply ports, located at an end of the array, is disposed

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substantially on the central line of the corresponding ink chamber in the widthwise direction thereof.

- Claim 13's providing for plural through-holes, at least one of which includes plural recessed portions offset one from another to compensate for a difference in array pitch in the widthwise direction between the ink supply ports and the ink outflow ports when the ink cartridge is viewed in a direction perpendicular to the arraying direction;
- Claim 20, which says that the array pitch of the ink outflow ports is different from an array pitch of the ink supply ports, and recessed portions are vertically arranged and are disposed so that their axes are offset in the widthwise direction from one another to compensate for a difference in array pitch in the widthwise direction between the ink supply port and the ink outflow port for at least one of the ink supply ports; and
- Claim 30, which provides that each of the ink outflow ports is disposed substantially on a central line of the corresponding ink chamber in a widthwise direction, one of the ink supply ports, located at an end of the array is disposed substantially on the central line of the corresponding ink chamber in the widthwise direction thereof; and at least another one of the ink supply ports is disposed offset from the central line of the corresponding ink chamber in the widthwise direction thereof.

Such features are not suggested by Figs. 3(a) - 4(c) because the ink supply ports, seen from the outside, are all arranged at constant separations, and the internal arrangement of the ink cartridges is not shown. Figs. 5(a) and 5(b) only show an embodiment in which the ink

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supply ports are arranged in the widthwise direction at a constant separation, and the ink supply ports and internal structure of the ink supply portions are centered in the ink chambers (Fig. 5(a) is not a widthwise picture). And Figs. 10(a) and 10(b) just show a cartridge where all of the ink supply ports and associated internal structures are centered in the ink chambers, and just one ink supply port is arranged at a different pitch - the other three ink supply ports are arranged at the same pitch.

So Shimada in no way identically discloses or even suggests all the features of the claimed invention, which accommodates variations in ink chamber width by controlling the positioning of the ink supply ports and related structure, which allows for the production of compact ink cartridges.

The remaining rejected claims, claims 2-11, 14-19 and 21-29, all ultimately depend from and so incorporate by reference the features of independent claims just shown to avoid the cited art. These claims are therefore patentable over that art at least for the same reasons as their respective base claims, which reasons are incorporated by reference herein.

For all the foregoing reasons, favorable consideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

Applicants have made a diligent effort to place this application in condition for allowance and submit that the claims are in condition for allowance. If for any reason, however, the Examiner should deem that this application is not in condition for allowance, the Examiner is respectfully requested to telephone the undersigned attorney at the number listed below to resolve any outstanding issues prior to issuing a further Office Action.

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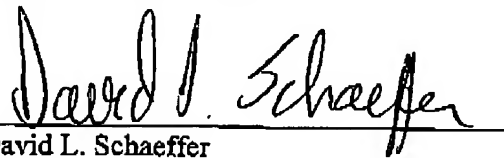
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In view of the foregoing revisions and remarks, Applicants respectfully request entry of this Amendment After Final Rejection and submit that entry of this Amendment will place the present application in condition for allowance. It is further submitted that entry of this Amendment can be approved by the Examiner consistent with Patent and Trademark Office practice, since the changes it makes should not require a substantial amount of additional work by the Examiner. It is believed that the changes presented in this Amendment either address matters of form or issues that the Examiner has previously considered.

The Commissioner is authorized to charge any fee now or hereafter due in connection with the prosecution of this application to Deposit Account No. 19-4709.

Prompt and favorable consideration are respectfully requested.

Respectfully submitted,



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